

WHAT IS CLAIMED IS:

1. An acoustic energy device for converting flow energy of a process liquid to acoustic energy, said device comprising:
 - a housing having an inner diameter, a first housing end with an inlet orifice, a second housing end with an outlet orifice, and an expanded flow area extending between said inlet orifice and said outlet orifice; and
 - oscillatory means assembled within said expanded flow area;
 - wherein said inlet orifice is narrower in diameter than said inner diameter and a flow of said process liquid through said inlet orifice into said expanded flow area results in turbulent flow; and
 - wherein said turbulent flow causes said oscillatory means to vibrate.
2. The acoustic device of claim 1, said housing having a longitudinal axis that extends from a center point of said first housing end to a center point of said second housing end, wherein said oscillatory means includes a plurality of baffles, each baffle of said plurality of baffles having a face with a through-hole and an outer perimeter of said face corresponding substantially with said inner diameter of said housing, and wherein said baffle is assembled within said housing such that said face is aligned transverse to said longitudinal axis of said housing.
3. The acoustic device of claim 2, wherein said baffle includes a flow-control baffle, wherein said through-hole of said flow-control baffle is a flow-control aperture with a small diameter.
4. The acoustic device of claim 3, wherein said baffle includes at least two of said flow-control baffle and a spacer, wherein said through-hole of said spacer is a pass-through aperture having a diameter substantially larger than said small diameter of said flow-control aperture, and wherein each said flow-control baffle is separated from another said flow-control baffle by said spacer.

5. The acoustic device of claim 4, wherein said flow-control baffle includes a single-aperture flow-control baffle and a multiple-aperture flow-control baffle, said single-aperture baffle having a single flow-control aperture and said multiple-aperture baffle having multiple flow-control apertures.
6. The acoustic device of claim 1, further comprising a housing seal assembly comprising a seal cap, an O-ring, and a nipple insert, said assembly fitting over said first end of said housing and said nipple insert providing a flow path into said inlet.
7. The acoustic device of claim 1, wherein said oscillatory means includes an oscillatory circuit and a pair of piezoelectric members electrically connected to said oscillatory circuit, said pair of piezoelectric members including a first piezoelectric member and a second piezoelectric member, wherein said flow of said process liquid through said expanded flow area causes said piezoelectric members to vibrate and produce acoustic waves, and wherein said piezoelectric members are arranged such that said acoustic waves emanate from said piezoelectric members in a direction transverse to said longitudinal axis.
8. The acoustic device of claim 7 further comprising a flow partition disposed between said piezoelectric members and extending in a direction parallel to said longitudinal axis.
9. The acoustic device of claim 7, wherein at least said first piezoelectric member is electrically connected to said oscillatory circuit.
10. The acoustic device of claim 7 further comprising a pulse generator, wherein at least said first piezoelectric member is electrically connected to said pulse generator.
11. The acoustic device of claim 7 further comprising multiple pairs of said piezoelectric members, said pairs arranged within said expanded flow area in series.